Objectives
To explain the association between white matter and basal nuclei.
To briefly outline the components of the diencephalon & brain stem.
To examine the role of the cerebellum in coordination.
To address functional brain systems.
Identify the meaning of “consciousness.”
Define different states of consciousness.

White matter
Material responsible for communication between cerebral cortex and lower CNS centers i.e. with the spinal cord.
Composed of myelinated fibers bundled into large tracts.
Commissures: fibers allowing communication between the two hemispheres.
> Corpus callosum (largest)

Basal nuclei
Associated with subthalamic nuclei i.e. the floor of the diencephalon
Gray matter composed of distinctive cell groups: e.g. Caudate & Lentiform.
Play a role in motor control, may be involved with:
- Attention
- Cognition.
Disorders of the basal nuclei show up as too much or too little movement such as Huntington’s or Parkinson’s diseases.

Diencephalon
Gray matter of the third ventricle (located at the core of the forebrain)
I. Thalamus – relay station
II. Hypothalamus – homeostasis regulator
III. Epithalamus – pineal gland & choroid plexus.
Diencephalon is purple – Brain Stem Green

Brain Stem (intro)
Superior to Inferior –
> Midbrain – visual & auditory reflex centers & fear
> Pons – regulation of respiration
> Medulla Oblongata – respiratory rhythm & heart rate

Histology: similar to the spinal cord i.e. gray matter is deep and white matter surrounds it.

Controls –
Automatic behaviors for survival
Heavily involved with the innervation of the head

Cerebellum
Accounts for 11% of the total brain mass. W&G matter
Transverse cerebral fissure

Functions:
> Timing and appropriate patterns of skeletal muscle contraction
> Coordinates fine movements for agility e.g. playing an instrument
> Functions Subconsciously
> Responds to proprioceptors to correct movements.

............if damaged what would happen?

Cerebellum is like a coach
I. Coordinator of the moves.
Muscle movements are sure, deliberate and with the appropriate corrective measures to carry out the action.

II. Plans the “play” recognizes and predict sequences of events so that it may adjust for multiple forces exerted on a limb.

Functional Brain Systems
I. Limbic System Fig 12.18
Medial to the cerebral hemispheres & diencephalon
Emotional component
Depressants interferes with functioning

II. Reticular formation Fig 12.19
modulate skeletal muscle action/posture respiratory & cardiovascular centers
Arousal
Pain modulation
Consciousness

Perception of sensations, voluntary initiation and control of movement and capabilities associated with higher mental processing including:
- Memory
- Logic
- Judgment
- Perseverance

A continuum that can be judged based on the ability to respond to stimuli:
- Alertness
- Drowsiness / lethargy
- Stupor
- Coma

Loss of Consciousness

**Fainting** – brief loss, usually due to inadequate blood flow e.g. hemorrhage or sudden emotional stress.

**Coma** – Total unresponsiveness to sensory stimuli, oxygen use by cells is low.

**Brain Death** – no response & irreversible loss of brain activity.

The Blood Brain Barrier

Helps maintain a stable environment.

Selective
- Allows passage of glucose, essential amino acids, some electrolytes.
- Toxins and metabolic wastes, proteins are denied passage.

Absent in region of 3rd & 4th ventricles.